Appl. No. 10/070,342
Amdt. dated 3 July 2003
Reply to Office action of 7-Apr-03

Listing of Claims:

1. (**Currently amended**) A tool for cutting a soft electrically-conductive material, comprising:

a radio-frequency (RF) source electrically connected to an impedance matching circuit comprising a tuning element electrically connected to an inductive element; and

said inductive element electrically connected to a conductive cutting tip through a switch-contact area;

whereby said impedance matching circuit is encased by a handheld-sized probe housing, and said switch-contact area is ~~interconnected with~~ encased by said housing.

2. (**Currently amended**) The tool of Claim 1 wherein: the soft electrically-conductive material is selected from the group consisting of biological tissue, phantom tissue, and polymers; said inductive element comprises a transformer for inducing at least one eddy current in the electrically conductive material within a region of the material to be cut; said probe housing comprises an electrically insulative layer; said cutting tip is releasably engagable to said probe housing; and said RF source comprises an RF signal generator and an amplifier; ~~and said switch-contact area is encased by said probe housing~~.

3. (**Original**) The tool of Claim 2 wherein said probe housing is generally cylindrical in shape and made of metal, said insulative layer comprises a dielectric coating thereon; said tuning element comprises a capacitor; a first end of said tip extends outwardly from said housing; and a second end portion of said tip is so engaged with a release mechanism that comprises a catch for engagement within a distal end of said probe housing.

4. (**Original**) The tool of Claim 2 wherein: said transformer is a step-up transformer having a primary winding a first winding of which is connected to a ground; said tuning element comprises a capacitor electrically connected to a center-tap of said transformer; a first end of said tip extends outwardly from said housing through a generally nonconductive sleeve; and a second end portion of said tip is so engaged with a release mechanism.

5. (**Original**) The tool of Claim 4 wherein said insulative layer comprises a tubular polymeric shell; said probe housing further comprises an EM-shielding layer adhered to an inner wall of said shell; said release mechanism comprises a threaded-section engagable within said generally nonconductive sleeve; and said switch-contact area is of an optical switch.

6. (**Original**) The tool of Claim 4 wherein said RF source is in electrical communication with said capacitor through a cable and a cable-release assembly; said step-up transformer has a secondary to primary winding ratio of 2:1 and further comprises a magnetic core; and said release mechanism is encased within said probe housing.

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7. (Original) The tool of Claim 1 wherein said switch-contact area is of a switch comprising a nonconductive protuberance extending through an aperture in a casing for said switch, said protuberance having at least one surface in contact with a spring-engaged conductive-pathway; whereby a sufficient force directed against said protuberance causes said conductive-pathway to make contact with said switch-contact area allowing an electric current to flow.

8. (Re-presented – formerly dependent claim #8) ~~The tool of Claim 7~~ A tool for cutting a soft electrically-conductive material, comprising:

a radio-frequency (RF) source electrically connected to an impedance matching circuit comprising a tuning element electrically connected to an inductive element;

said inductive element electrically connected to a conductive cutting tip through a switch-contact area;

whereby said impedance matching circuit is encased by a handheld-sized probe housing, said switch-contact area is of a switch comprising a nonconductive protuberance extending through an aperture in a casing for said switch, said protuberance having at least one surface in contact with a spring-engaged conductive-pathway;

whereby a sufficient force directed against said protuberance causes said conductive-pathway to make contact with said switch-contact area allowing an electric current to flow; and

wherein: said RF source is in electrical communication with said tuning element through a cable and a cable-release assembly; said conductive-pathway comprises an elongated member; and a stay is incorporated with an inner wall of said switch casing that supports said elongated member until said sufficient force is directed against said protuberance allowing said electric current to flow to said tip.

9. (Original) The tool of Claim 8 wherein: said stay comprises a first and second projection against which said elongated member abuts, said projections being affixed to said inner wall in proximity to said switch-contact area; a second end portion of said tip is releasably interconnected to a distal end of said probe housing such that, upon said interconnection, said tip is in electrical communication with said switch-contact area.

10. (Original) The tool of Claim 7 wherein said surface of said protuberance is that of a foot in contact with said spring-engaged conductive-pathway; said conductive-pathway comprises a thin plate member; and said switch-contact area comprises a first and second sub-area each atop, respectively, a first and second ledge secured to said switch casing; and said switch further comprises a spring assembly interposed between said plate member and an inner surface of said casing.

11. (Original) The tool of Claim 10 wherein: said inductive element comprises a transformer to which said first sub-area is electrically connected; a first end of said tip extends outwardly from said housing; a second end portion of said tip is releasably engaged to a distal end of said probe housing; such that, upon said interconnection, said tip is in electrical communication with said second sub-area.

12. (Original) The tool of Claim 1 wherein: said inductive element comprises a step-up transformer having a primary and secondary winding around a core selected from the group consisting of iron powder cores and ferrite cores, and said tuning element comprises a capacitor electrically connected to a center-tap of said transformer; and further comprising a switch electrically connected between said secondary winding and said tip such that making electrical contact of a conductive-pathway of said switch with said switch-contact area allows an electrical current to flow to said tip.

13. (Original) The tool of Claim 12 wherein: said RF source operates at least over a frequency range of 10 to 30 MHz; said probe housing is generally cylindrical in shape and comprises an electrically insulative layer and an EM-shielding layer; a first end of said tip extends outwardly from said housing; and a second end portion of said tip is interconnected with a release mechanism to a distal end of said housing.

14. (Currently amended) A method for cutting a soft electrically-conductive material using a probe to which a radio-frequency (RF) source is electrically connected, comprising the steps of:

providing RF power from the source to an impedance matching circuit electrically connected to a conductive cutting tip through a switch-contact area, said circuit and said switch-contact area being encased by a handheld-sized housing for the probe~~, said switch-contact area interconnected with said housing~~; and

making contact with said switch-contact area by activation of an assembly interconnected with said housing to allow an electric current to flow through said impedance matching circuit.

15. (Original) The method of Claim 14 wherein said current is flowing through an inductive element of said impedance matching circuit comprising primary and secondary windings around a core; and further comprising the steps of positioning the probe in proximity to the electrically-conductive material and inducing at least one eddy current in the soft electrically-conductive material within a region of the material to be cut.

16. (Currently amended) The method of Claim 15 wherein: the soft electrically-conductive material is selected from the group consisting of biological tissue, phantom tissue, and polymers; said step of providing RF power further comprises providing said power through a

cable electrically connected to said tuning circuit; and said step of making contact further comprises allowing said electric current to flow through said tip for the cutting~~, wherein said switch-contact area is encased within said probe housing~~.

17. (**Original**) The method of Claim 14 wherein said step of making contact further comprises directing a sufficient force against a non-conductive switch-protuberance having at least one surface in contact with a spring-engaged conductive pathway within a switch casing, such that said conductive-pathway makes contact with said switch-contact area.

18. (**Original**) The method of Claim 17 wherein said step of directing said force further comprises compressing a spring assembly interposed between said conductive-pathway and an inner surface of said switch casing; and

further comprising the steps of, first, engaging a cable to a cable-release assembly to connect the RF source; and releasably engaging a second end portion of said tip to a distal end of said probe housing to electrically connect said tip with said switch-contact area.

19. (**Original**) The method of Claim 14 wherein the soft electrically-conductive material is selected from the group consisting of biological tissue, phantom tissue, and plastic; said electric current flowing through said impedance matching circuit comprises allowing said current to flow through a tuning element electrically connected to an inductive element; and said step of making contact further comprises directing light waves through an optical fiber to said switch-contact area comprising a photodetector.

20. (**Currently amended**) The method of Claim 19 wherein said step of making contact further comprises allowing said electric current to flow through said tip, extending outwardly from said probe housing, and into the soft electrically-conductive material for the cutting; and further comprising the steps of positioning the probe in proximity to the electrically-conductive material and inducing at least one eddy current in the soft electrically-conductive material within a region of the soft electrically-conductive material to be cut.